

**PUBLIC NOTICE  
INITIATION OF RISK ASSESSMENTS  
FOR CHEMICALS IN DRINKING WATER**

**Pesticide and Environmental Toxicology Section  
Office of Environmental Health Hazard Assessment  
California Environmental Protection Agency**

**May 2002**

## **PUBLIC NOTICE: INITIATION OF RISK ASSESSMENTS FOR CHEMICALS IN DRINKING WATER**

### **A. Requirements**

The Calderon-Sher California Safe Drinking Water Act of 1996 (as amended in 1999 by Senate Bill 635) requires the Office of Environmental Health Hazard Assessment (OEHHA) to post notices on its Web site of water contaminants for which it is initiating work, pursuant to development of a public health goal (PHG) for the chemical in drinking water. The law also describes the intent and general context of the PHGs. PHGs are concentrations of chemicals in drinking water that are not anticipated to produce adverse health effects following long-term exposures. These goals are non-regulatory in nature but are to be used as the health basis to update the state's primary drinking water standards (maximum contaminant levels, or MCLs) established by the California Department of Health Services (DHS) for chemicals subject to regulation.

The act requires PHGs to be developed for the approximately 85 chemicals for which state MCLs are presently available, and review and update of the risk assessments at least every five years. Other chemicals may be added to the list by legislative or interdepartmental request. Opportunities for public comment and peer review are provided.

### **B. Implementation**

OEHHA has published 58 PHGs as of January 2002, although one of these evaluations, that for total chromium, has been rescinded. The technical support documents for the published PHGs are posted on the OEHHA Web site at [www.oehha.ca.gov](http://www.oehha.ca.gov).

PHGs for all the other chemicals that have state MCLs are currently in preparation, plus a PHG for perchlorate, which is presently unregulated. Twelve of these PHGs are planned to be released for public review this year. A 45-day public comment period will be provided after posting, followed by a public workshop. Scientific peer reviews are arranged through the University of California. The overall process will include allotting time for revisions, further public comment, and preparing responses to comments. They are planned for publication in 2003. The evaluation process continues for the remainder of the chemicals, with release for public review as soon as possible.

We are now announcing initiation of the risk assessment process for hexavalent chromium. The first draft for public review is planned for 2002.

### **C. PHGs soon to be released for public review (Announced July 2001)**

Draft documents for the following chemicals are nearing completion, and are planned for release for public review as soon as possible:

Arsenic	Chlorobenzene	Silvex
Asbestos	Diethylhexyl adipate	1,1,2,2-Tetrachloroethane
Barium	Ethylene dibromide	Toxaphene
Beryllium	Hexachlorobenzene	

### **D. Risk assessments under development (Announced July 2001)**

Risk assessment is continuing on the following chemicals, as previously announced:

1,1-Dichloroethane	Radionuclides (gross alpha and beta emission)	
1,2-Dichloroethylene	Radium 226 and 228	1,1,1-Trichloroethane
Dioxin	Selenium	1,1,2-Trichloroethane
Molinate	Strontium	Trihalomethanes
Polychlorinated biphenyls	Styrene	Tritium

### **E. Initiation of risk assessments**

Risk assessment is commencing on the following chemical:

Hexavalent chromium

A brief description for hexavalent chromium is provided below. This announcement solicits the submission of pertinent information specifically on this contaminant that could assist our office in preparing the risk assessment and deriving a PHG.

Information submitted to OEHHA in response to this request for hexavalent chromium should not be proprietary in nature, because all information submitted is a matter of public record. Information should be submitted by July 1, 2002 to:

Edna Hernandez  
PHG Project  
Pesticide and Environmental Toxicology Section  
Office of Environmental Health Hazard Assessment  
1515 Clay St., 16<sup>th</sup> floor  
Oakland, California 94612

All data submitted will be considered in the development of the PHG for hexavalent chromium. The draft document will be available for discussion in a public workshop and public comment will be solicited as described above in Section B. The final risk assessment will be utilized by DHS in potential revisions to the MCL for the chemical in drinking water, as described in more detail on the DHS Web site at <http://www.dhs.ca.gov/ps/ddwem/chemicals/chemindex.htm>.

## **F. Descriptions of chemicals or substances for review initiation**

### **HEXAVALENT CHROMIUM (CHROMIUM VI)**

Chromium, atomic weight 51.996, is a metallic element which generally occurs in small quantities associated with other metals, particularly iron. Chromium melts at 1,875° C, and boils at 2,680° C. The specific gravity of chromium is 7.19. The most common valences of chromium in the environment are 0, +3 and +6. Chromium forms a number of salts, which are characterized by a variety of colors, solubilities and other properties. The name “chromium” is from the Greek word for color.

The metal is usually produced by reducing chromite ( $\text{FeCr}_2\text{O}_4$ ) ore with aluminum (Weast et al., 1988). The combined production of chromium metal and chromium ferroalloys in the United States in 1988 was 120,000 metric tons (ATSDR, 1993). Most of this metal is used in the metallurgical, refractory and chemical industries (ATSDR, 2000). Chromium is used to harden steel, in the manufacture of stainless steel, and in the production of a number of industrially important alloys (Weast et al., 1988). Chromium is used in making of pigments, in leather tanning and for welding. Chromium plating produces a hard mirror-like surface on metal parts that resists corrosion and enhances appearance.

Chromium enters environmental waters from anthropogenic sources such as electroplating factories, leather tanneries and textile manufacturing facilities. Chromium also enters groundwater by leaching from soil. Serpentine rock, which is common in California, is one important source. Chromium can exist in water as either Cr III or Cr VI. As of February 4, 2002, 32 percent of the sources of water that collectively serve approximately 20 million of the state's 34 million residents had been analyzed for hexavalent chromium (California Department of Health Services, 2002). Hexavalent chromium was detected in 59 percent of the drinking water sources sampled.

The Chromate Toxicity Review Committee (2001) considered questions regarding the potential carcinogenicity of hexavalent chromium by the oral route at the request of the California Environmental Protection Agency. The committee reviewed the pertinent scientific literature, and was able to draw several conclusions with respect to the previous PHG for total chromium that was recommended by OEHHA. “OEHHA based their recommendation upon a specific animal study performed by Borneff et al. in 1968. The study used by OEHHA to develop this risk assessment, Borneff et al. (1968), is not suitable for use as the basis for a quantitative risk assessment for several reasons, as detailed in the report. We found no basis in either the epidemiological or animal data published in the literature for concluding that orally ingested Cr(VI) is a carcinogen, and a relatively large number of negative studies by the oral route of exposure, even at concentrations in excess of current MCLs. Definitive data on the potential carcinogenicity of orally ingested Cr(VI) should be provided by a planned NTP study, but these results will not be available for several years. While the regulatory agencies wait for these results to perform a definitive risk assessment, we would suggest that the current California MCL for total chromium of 50 ppb should be deemed protective of human health. Additional studies of the relative abundance of Cr(VI) in California drinking water supplies should be

performed, with special emphasis on testing and validation of currently approved EPA standard methods, which may not be reliable when sampling procedures are not scrupulously controlled.”

Exposure to high concentrations of hexavalent chromium in air has been associated with nasal irritation, sneezing, itching, nosebleeds, and nasal septum perforations (ATSDR, 2000).

Exposure of workers to hexavalent chromium in air has been linked to lung cancer. Hexavalent chromium has been classified as Group A (human carcinogen) by the inhalation route and as Group D (not classifiable as to human carcinogenicity) by the oral route by the U.S. Environmental Protection Agency (U.S. EPA, 1998). The existing data on health effects of inhalation, oral, and dermal exposure of humans and animals to chromium VI are summarized below (ATSDR, 2000). For humans, one or more studies exist in the following areas:

1) Inhalation – acute, intermediate, and chronic systemic effects; and immunologic/lymphorectic, neurologic, developmental, genotoxic and carcinogenic effects. 2) Oral - death; acute systemic effects; and immunologic/lymphorectic, neurologic, and carcinogenic effects. 3) Dermal – death; acute, intermediate, and chronic systemic effects; and immunologic/lymphorectic effects. For animals, one or more studies exist in the following areas: 1) Inhalation – death; intermediate and chronic systemic effects; and immunologic/lymphorectic, reproductive, developmental, genotoxic, and carcinogenic effects. 2) Oral – death; acute, intermediate, and chronic systemic effects; and immunologic/lymphorectic, neurologic, reproductive, developmental, genotoxic and carcinogenic effects. Identification of the existing information above does not imply anything about the quality of the study or studies which are to be evaluated nor presume anything about the results.

U.S. EPA’s maximum contaminant level goal (MCLG) for total chromium is 0.1 mg/L, and the MCL is also 0.1 mg/L. There are no separate standards for chromium III and chromium VI (U.S. EPA, 2000). U.S. EPA also has 1-day and 10-day health advisories of 1 mg/L for total chromium for children (U.S. EPA, 2000). For adults, the drinking water equivalent level (DWEL, a lifetime exposure concentration protective of adverse non-cancer health effects, that assumes all of the exposure to contaminant is from drinking water) for total chromium is 0.1 mg/L. The reference dose (RfD) for hexavalent chromium for adults is 0.003 mg/kg-day (U.S. EPA, 1998). The California MCL for total chromium is 0.05 mg/L (22 CCR, section 64431, Table 64431-A-Inorganic Chemicals).

## References

ATSDR (1993). Toxicological profile for chromium. Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services.

ATSDR (2000). Toxicological profile for chromium. Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services.

California Department of Health Services (Feb 4, 2002) Chromium-6 in drinking water: An overview of sampling results.

<http://www.dhs.ca.gov/ps/ddwem/chemicals/Chromium6/samplingresults.htm>

Chromate Toxicity Review Committee (2001) Scientific Review of the Toxicological and Human Health Issues Related to the Development of a Public Health Goal for Chromium(VI). Published by the Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Available online at:

[http://www.oehha.ca.gov/public\\_info/facts/pdf/CrPanelRptFinal901.pdf](http://www.oehha.ca.gov/public_info/facts/pdf/CrPanelRptFinal901.pdf)

U.S. EPA (1998). Toxicological review of hexavalent chromium. In support of the summary information of the Integrated Risk Information System (IRIS), U.S. Environmental Protection Agency, Washington, DC.

U.S. EPA (2000). Drinking water standards and health advisories. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA 822-B-00-001 (Summer 2000).

Weast, RC, Astle, MJ, Beyer, WH, eds. (1988). CRC Handbook of Chemistry and Physics, 69th Edition (1988-1989). Chemical Rubber Company, Boca Raton, Florida.